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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,781	07/21/2006	Grant Berent Jacobsen	4702-46	1590
23117 7590 11/25/2008 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
FINK, BRIEANN R				
ART UNIT		PAPER NUMBER		
4131				
MAIL DATE		DELIVERY MODE		
11/25/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/586,781

**Applicant(s)**

JACOBSEN ET AL.

**Examiner**

BRIANN R. FINK

**Art Unit**

4131

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 9/21/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 7/21/2006 and 9/21/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 12 recites the phrase "substantial condensation" which renders the claim indefinite. The phrase "substantial condensation" is not defined in the claim and it is unclear as to the amount of condensation which allows it to be substantial.

***Claim Interpretation***

"Substantial condensation" appears to be defined by the amount of  $\alpha$ -olefin in the reactor; therefore, for examination purposes, the amount of  $\alpha$ -olefin considered to meet the limitation of substantial condensation of claim 12 will be interpreted as the ranges expressed in claims 15 and 17. Note, however, that this definition cannot be expressly used as a definition of "substantial condensation", as claims 15 and 17 would then be rendered as improper under 35 U.S.C. 112, 4<sup>th</sup> paragraph as failing to further limit claim 12.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 12, 14-16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by *Murray* (US 2003/0171206).

*Murray* discloses single-site, imino-amide catalyst precursors and catalysts useful for the polymerization of olefins, like ethylene, and higher alpha-olefins (p. 1, [0001] and [0029]). The catalysts may contain a metallocene complex (p. 3-4, [0054]). Gas phase polymerization is preferred using one or more olefins, one of which is ethylene (p. 10, [0114]). *Murray* discloses that a preferable polymerizable combination is that of ethylene with an  $\alpha$ -olefin comonomer having 4 to 12 carbons (p. 10, [0117]). A typical gas phase polymerization process used for this polymerization is a continuous, fluidized bed process (p. 10, [0121]).

As to claim 15, *Murray* discloses a preferable mole ratio of comonomer to ethylene of 0.002 to 0.008. This ratio is equivalent to the partial pressure ratio of comonomer to ethylene, which can be shown when applied to the ideal gas law ( $pV = nRT$ ). The range taught by *Murray* is within that of claim 15; therefore, it is considered to be sufficiently specific to anticipate claim 15.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 13, 15 and 18-19 rejected under 35 U.S.C. 103(a) as being unpatentable over *Murray* (US 2003/0171206), as applied to claim 12.

The range of claim 15 is rejected above as being anticipated by *Murray*; however, assuming in the alternative that the range of *Murray* is not sufficiently specific to anticipate claim 15, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the range taught by *Murray*.

As noted above, *Murray* anticipates claim 12; however *Murray* does not teach the partial pressure of ethylene as defined in claim 13. *Murray* does teach the mole ratio of comonomer to ethylene, as well as the reactor pressure; therefore, assuming that there are no other gases present in the reactor, the partial pressure of ethylene can be obtained as follows:

The lower limit of the mole ratio of comonomer to ethylene is 0.002. The mole ratio of comonomer to ethylene can also be expressed as 0.002 moles of comonomer to 1 mole of ethylene; therefore, for every 1 mole of ethylene, there are 1 plus 0.002 moles of comonomer and ethylene. 1 mole of ethylene to 1.002 moles of comonomer and ethylene is equivalent to the mole fraction of ethylene in the mixture of comonomer and ethylene ( $x_{Et}$ ). The mole fraction of ethylene in the mixture of comonomer and ethylene ( $x_{Et}$ ) and the pressure in the reactor ( $P$ ) can be used to calculate the partial pressure of ethylene in the reactor ( $P_{Et}$ ) as shown in the following equation:  $P_{Et} = x_{Et} \cdot P$ . The pressure in the reactor ( $P$ ) is

taught by *Murray* as being preferably between 1.379 MPa and 2.759 MPa (p. 11, [0122]). Using the lower limit of the pressure in the reactor, 1.379 MPa, the partial pressure of ethylene is 1.721 MPa ( $P_{Et} = 1 \text{ mol}_{Et} / 1.002 \text{ mol}_{\text{Comonomer} + Et} \cdot 1.724 \text{ MPa}$ ). Using the same calculation with the upper limits of the mole ratio of comonomer and ethylene and the pressure in the reactor, the partial pressure of ethylene is 2.395 MPa ( $P_{Et} = 1 \text{ mol}_{Et} / 1.008 \text{ mol}_{\text{Comonomer} + Et} \cdot 2.414 \text{ MPa}$ ). The range calculated from *Murray* of the partial pressure of ethylene is around 1.721 MPa to 2.395 MPa. This range overlaps the claimed range of claim 13, and it has been held that overlapping ranges are sufficient to establish *prima facie* obviousness. See MPEP 2144.05.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the overlapping portion of the range taught by the reference because overlapping ranges have been held to establish *prima facie* obviousness.

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Murray* (US 2003/0171206), as applied to claim 12 above, in view of *Muhle et al.* (US 6,180,736).

*Murray* anticipates claim 12, as noted, but fails to teach the partial pressure of 1-decene when copolymerized with ethylene in a gas phase polymerization reaction.

*Muhle et al.* discloses a gas-phase polymerization process used to polymerize ethylene and one or more comonomers with metallocene catalysts

(col. 3, ll. 14-17). *Muhle et al.* teaches that a highly incorporating catalyst can produce low density polyethylene with a low ratio of alpha-olefin/ethylene reactants (col. 2, ll. 52-54). *Muhle et al.* further teaches that a higher concentration of alpha-olefin produces a higher concentration of dissolved alpha-olefin in the polymer particles, therefore causing agglomeration which slows the polymerization process (col. 2, ll. 55-58).

It is known in the art that higher alpha-olefins have higher boiling points, such that 1-decene has a greater boiling point than 1-octene. Being that the polymerizations are run in the condensed mode, the higher alpha-olefin is typically introduced into the fluidized bed reactor as a liquid through the recycle stream, which is then turned into a gas. Further, more energy is required to vaporize the same amount of 1-decene than 1-octene. Therefore, if a large amount of 1-octene is incorporated into the reactor, a large concentration of dissolved 1-octene will be present, which as taught by *Muhle et al.* creates a great amount of agglomeration. On the other hand, if the same large amount of 1-decene is incorporated into the reactor, an even greater amount of dissolved 1-decene will be present than 1-octene, creating even more agglomeration. As shown, there is a reverse correlation between the number of carbons in the higher alpha-olefin and the amount that should be present in the reaction, such that the more carbons in the carbon chain, the lower the concentration in the reaction.

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have modified the polymerization of *Murray et al.* as suggested by *Muhle et al.* by minimizing the higher alpha-olefin content to reduce agglomeration and therefore allow for greater production rates.

7. Claims 19-20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Murray* (US 2003/0171206), as applied to claim 1 above, and further in view of *Babb et al.* (US 6,627,573).

*Murray* anticipates claim 12, as noted, but fails to teach the metallocene catalyst defined in the instant claim 21.

*Babb et al.* teaches a titanium(II) metal coordination catalyst complex, such as the catalyst defined in claims 19, 20 and 22 (col. 15, l. 38 – col. 16, l. 8, and . *Babb et al.* further teaches that the above complex can be used advantageously in the copolymerization of olefins in the gas phase, especially the copolymerization of ethylene with higher alpha olefins (col. 22, ll. 14-18). They can also be used in the manufacturing of linear low density polyethylene (LLDPE) (col. 22, ll. 20-24). Further the gas phase polymerization can be carried out in a fluidized bed reaction zone, which also employs the condensed mode (col. 22, ll. 64-67) and also in a continuous process (col. 23, ll. 9-10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a titanium (II) catalyst complex as suggested by *Babb et al.* in the polymerization process of *Murray et al.* because it is preferably used to polymerize ethylene and higher alpha olefins.



8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Murray* (US 2003/0171206), as applied to claim 12 above, in view of *Devore et al.* (US 5,470,993) and further in view of *Babb et al.* (US 6,627,573).

*Murray* anticipates claim 12, as noted, but fails to teach the metallocene catalyst defined in the instant claim 21.

*Devore et al.* discloses titanium or zirconium catalyst complexes in the +2 oxidation state as defined in claim 21 of the instant invention (col. 6, ll. 16-50). *Devore et al.* further teaches that the catalyst complexes can be used in a gas phase polymerization process and can be used to polymerize addition polymerizable monomers (col. 3, ll. 46-54). Further, the complexes catalyze with great efficiency at high temperatures (col. 3, ll. 62-63). The diene group is able to undergo chemical reactions or replacement by another ligand (col. 4, ll. 30-33). *Devore et al.* further teaches that the catalysts can be used in reaction environments with temperatures from 0 to 250°C and pressures of 0.1 to 100 MPa (col. 19, ll. 11-15).

*Babb et al.* also discloses the same catalyst compounds as *Devore et al.* *Babb et al.* further teaches that the above complexes can be used advantageously in the copolymerization of olefins in the gas phase, especially the copolymerization of ethylene with higher alpha olefins (col. 22, ll. 14-18). They can also be used in the manufacturing of linear low density polyethylene (LLDPE) (col. 22, ll. 20-24). Further the gas phase polymerization can be carried

out in a fluidized bed reaction zone, which also employs the condensed mode (col. 22, ll. 64-67) and also in a continuous process (col. 23, ll. 9-10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a titanium (II) catalyst complex with a pi-bonded group as suggested by *Devore et al.* and *Babb et al.* in the polymerization process of *Murray et al.* because it is stable at high temperatures and is preferably used to polymerize ethylene and higher alpha olefins.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIEANN R. FINK whose telephone number is (571)270-7344. The examiner can normally be reached on Monday through Friday, 7:00 AM to 4:30 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

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